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STUDIES OF NEOTROPICAL COMPOSITAE–IX. FOUR NEW SPECIES OF *CALEA* (NEUROLAENEAE) FROM BOLIVIA, BRAZIL, AND PARAGUAY

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ABSTRACT

Four new species of *Calea* (Neurolaeneae) from planaltine South America are described. Paraguayan *Calea cabrerae* Pruski is placed in *Calea* sect. *Monanthocalea* and to *Calea* sect. *Meyeria* are referred Brazilian *Calea diffusa* Pruski, Bolivian *Calea huanchacana* Pruski, and Brazilian *Calea tocantina* Pruski. Each of the new species is allopatric and extremely disjunct from nearest congeners. *Calea angustifolia* Gardner is resurrected from synonymy of *Calea multiplinervia* Less., *Calea bahiensis* (Mattf.) H. Rob. of the *Calea pilosa-angusta* group is recognized as distinct, *Calea papposa* Malme is vouchered in Bolivia, and *Calea rupicola* Chodat is documented in Brazil.

KEY WORDS: Asteraceae, Bolivia, Brazil, *Calea*, Compositae, Heliantheae, Neotropics, Neurolaeneae, Paraguay.

Four new species of *Calea* (Neurolaeneae, a tribe segregated by Rydberg 1927 from Heliantheae) from planaltine South America are described preliminary to my revision of South American *Calea* (viz Pruski 2011). *Calea cabrerae* Pruski is described from Paraguay and following the circumscription of Pruski (1998, 2005) may be positioned in *Calea* sect. *Monanthocalea* (Less.) Pruski, a group characterized by very narrowly paleate clinanthia and usually by large monocephalous capitula with long-pappose florets. Brazilian *C. diffusa* Pruski, Bolivian *C. huanchacana* Pruski, and Brazilian *C. tocantina* Pruski are described and placed in traditionally recognized *Calea* sect. *Meyeria* (DC.) Benth. & Hook. f., a speciose group characterized by its short to minute pappus and cymose to corymbiform capitulescences. Each of the new species is allopatric and extremely disjunct from nearest congeners: *C. cabrerae* and *C. abbreviata* Pruski & Urbatsch occur no closer than about 2100 kms; *C. diffusa* occurs about 540 kms northeast of *C. robinsoniana* Pruski; *C. huanchacana* occurs about 500 km north of *C. anomala* Hassler and about 1100 kms west of *C. candolleana* (Gardner) Baker; and the ranges of *C. tocantina* and *C. dalyi* Pruski & Urbatsch are about 2000 kms distant.

CALEA CABRERAE Pruski, **sp. nov. TYPE: PARAGUAY. Canindeyú.** Mbaracayú Natural Reserve, Aguará Ñú, cerrado scrub on red sandy soil, 24° 11' 01" S, 55° 16' 48" W, [ca. 225 m], 23 Sep 1999, *E. Zardini & S. Ramírez 51247* (holotype: MO; isotypes: AS, G, K, LP, NY, RB, US). Figs. 1–3.

Plantae herbaceae perennes 35–45 cm altae, caules simplices glabra vel subglabra; folia sessilia, lamina lineari-lanceolata 2.5–7.5 × 0.4–0.7 cm glabra; capitulescentia monocephala, pedunculis 15–25 cm longis sparse pilosa; capitula radiata 10–15 mm longa, involucrum campanulatum vel hemisphaericum 10–12 × 8–15 mm; phyllaria 22–27 gradatim 3–4-seriata, externa pyriformis, interna late ovata vel anguste oblanceolata; clinanthium paleaceum; paleae linearae vel lineari-lanceolatae 8–10 × circiter 0.3 mm; flosculi radiati 8–12, corolla 10.2–13 mm longa, limbo oblongo 7–9 × 2.5–3.5 mm 5-nervio; flosculi disci circiter 85–90, corolla infundibuliformis 5.5–6.7 mm longa glabra, lobis 1–1.2 mm longis; cypselae 4.5–5.3 mm longae setulosae; pappi squamae 11–15 oblongae 0.8–2 mm longae.

Slender strict unbranched perennial xylopodial herbs 35–45 cm tall; stems 3–11+ from xylopodium, subhexagonal proximally and pluricostate-sulcate distally, faces and costae concolorous and greenish-brown, or sometimes costae slightly paler than faces, glabrous or subglabrous, sparsely leafy in proximal half with 3–5 pairs of leaves, basal 1–2 nodes with reduced leaves shorter than internodes, the very basal pair of very small leaves often deciduous; xylopodium to ca. 3 cm diam. **Leaves** opposite, sessile, spreading to ascending; blade linear-lanceolate, 2.5–7.5 × 0.4–0.7 cm, stiffly chartaceous, 3-plinerved from broad base with the three main veins continuous with stem costae, the three main veins prominent on both surfaces, the secondary and tertiary veins few, noticeably thinner, impressed, reticulum indistinct, surfaces glabrous or subglabrous, apparently eglandular throughout or any potential glands collapsed if pressed in EtOH, base gradually narrow-attenuate, margins entire and sometimes narrowly callous-thickened, often slightly revolute, distal end gradually narrow-attenuate, very apex blunt (obtuse to rounded), slightly callous-thickened. **Capitulescence** strictly monocephalous and held well-above leaves, long-pedunculate on naked distal half of stem; peduncle 15–25 cm long, stiffly erect, ebracteate, 8–10-costate, sparsely pilose-hirsute to more densely so immediately below capitulum. **Capitula** radiate, ca. 100-flowered, 10–15 mm long; involucre campanulate to hemispherical, 10–12 × 8–15 mm; phyllaries 22–27, moderately graduated with the outer few about half as long as the mid-series and innermost, 3–4-seriate, pluristriate, appressed, entire, glabrous; outer 2–4 phyllaries pyriform, 5–7 × 2–4 mm, somewhat concave, chartaceous proximally and thinly subherbaceous distally, yellow-green, 5–7-nerved, glabrous and eglandular, apex gradually acuminate; abruptly transitioning to mid-series phyllaries ovate to broadly ovate, (5–)6–12 × 4–7 mm, obviously concave, chartaceous with narrowly scarious margins and apex, yellowish with darker nerves and apex, 7–13-nerved, each nerve with a single central embedded resin canal, apex obtuse to rounded; innermost series of phyllaries narrowly oblanceolate, 8–10 × 1–2 mm, more or less flat, much narrower than mid-series phyllaries and not visible without dissection, yellowish, usually 3-nerved, apex usually acute; clinanthium convex to low-conical, 2–2.5(–4) × 3–4 mm, paleate throughout, apex rounded to sometimes pointed; paleae linear or linear-lanceolate, 8–10 × ca. 0.3 mm, flat, 1-nerved, pale yellow, longer than the cypselae and pappus scales, reaching distally to about base of disk corolla lobes, entire. **Ray florets** 8–12; corolla 10.2–13 mm long, moderately exserted from involucre, yellow, glabrous, tube 3.2–4 mm long, limb oblong, 7–9 × 2.5–3.5 mm, 5-nerved, apparently eglandular abaxially or any potential glands collapsed if pressed in EtOH. **Disk florets** ca. 85–90; corolla narrow-funnelform, 5.5–6.7 mm long (4.2–5.5 mm long when dried), yellow, glabrous, tube 2–2.5 mm long, slightly dilated at base, shorter than to about as long as the abruptly but narrowly ampliate throat, lobes triangular-lanceolate, 1–1.2 mm long, much shorter than throat; anthers 2–2.5 mm long, apical appendage triangular; style base obconical, ca. 0.6 mm long, sitting atop and free from the annular nectary, nectary ca. 0.3 mm long, branches recurved, 1–1.2 mm long, apex convex, distal-abaxial papillae shorter than convex apex. **Cypselae** 4.5–5.3 mm long, obconic, 4-angled, slightly shorter than wet disk corollas (slightly longer than dried disk corollas), moderately setulose, slightly incurved basally, carpopodium oblique-annular, 0.2–0.3 mm long, sometimes inflated, duplex trichomes 0.2–0.3 mm long, antrorse; pappus scales 11–15, 0.8–2 mm long, oblong, much shorter than cypselae, shorter than the corolla tube, midzone thicker than margins, apex obtuse to rounded.

Distribution and Ecology. *Calea cabrerae* flowers in September and is known only from the type collection made at about 225 meters elevation in cerrado scrub in eastern Paraguay. This xylopodial herb occurs on the Cerro de Mbaracayú, which is situated between the south-flowing rios Paraguay and Paraná, about 550 kms northeast of their confluence near Corrientes, Argentina. The type locality is only about 20 km south of the frontier with Brazil, where *C. cabrerae* could reasonably be expected to occur in similar habitats of the Serra do Mbaracajú (Cerro de Mbaracayú) in neighboring Mato Grosso do Sul. The type locality is about 165 km north-northwest of Foz do Iguaçu, the famous waterfall near the three frontiers of Argentina, Brazil, and Paraguay.

Etymology. *Calea cabrerae* is dedicated to the late Dr. Ángel Cabrera, who provided a key to *Calea* in Argentina (Cabrera 1937) and authored several important regional Compositae floras of Argentina (e.g., Cabrera 1974, 1978) and Paraguay (e.g., Cabrera et al. 1996, 2009).

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MISSOURI BOTANICAL GARDEN
MISSOURI BOTANICAL GARDEN HERBARIUM
Nº 5149750
PARAGUAY Holotype
ASTERACEAE
Calea cabrerae Pruski
det. John Pruski, 2002
Canendiyú
Mbaracayú Natural Reserve administered by Fundación Moisés Bertoni: Aguará Ñú. Cerrado scrub on red sandy soil.
24°11'01"S 055°16'48"W
Herb 1 m. Corolla golden yellow.
23 September 1999
Elsa Matilde Zardini &
Silverio Ramírez Benítez 51247
Supported by National Geographic Society
MISSOURI BOTANICAL GARDEN (MO)
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Figure 1. Holotype of *Calea cabrerae* Pruski. (*Zardini & Ramírez 51247*, MO).

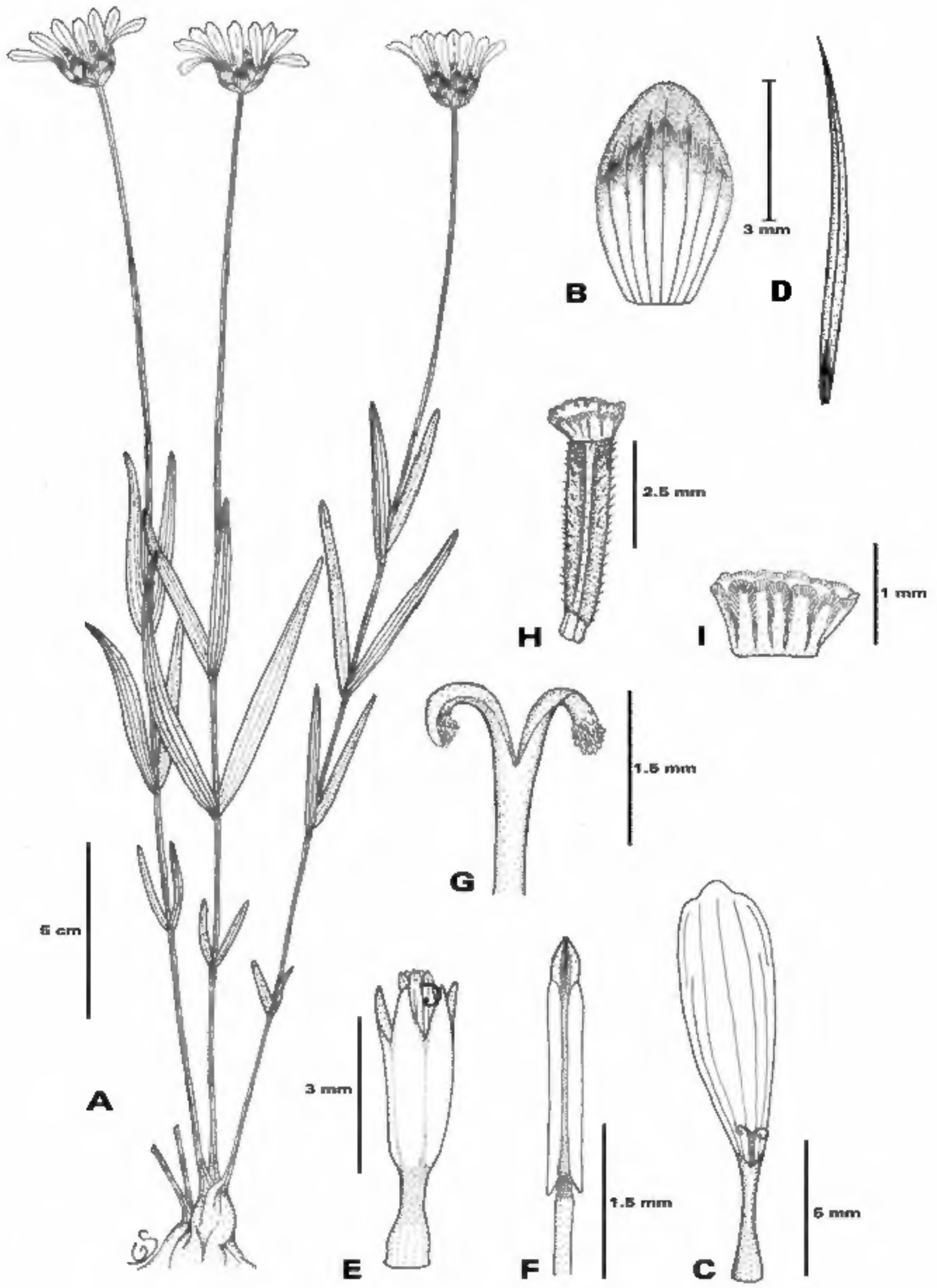

Figure 2. Line drawing of *Calea cabrerae* Pruski. A. Habit. B. Mid-series phyllary. C. Ray corolla. D. Palea. E. Disk corolla. F. Anther. G. Style branches. H. Cypsela. I. Close-up of pappus; scales subequal on individual cypselae, but sometimes twice as long as here. (from unmounted duplicates of *Zardini & Ramirez 51247*).

Calea cabrerae by its narrow paleae and long-pedunculate capitula falls within the regional xylopodial *Calea* sect. *Monanthocalea* as delineated by Pruski (1998), but differs clearly from the typical group (e.g., *C. cuneifolia* DC., *C. multiplinervia* Less., and *C. uniflora* Less.), species of which are characterized by their elongate pappus scales about as long as the disk corollas. Nevertheless, *C. cabrerae* is similar in *gestalt* (simple-stemmed sparsely narrow-leaved monocephalous xylopodial herbs) to the widespread *C. multiplinervia* Less. and the narrow-leaved *C. angustifolia* Gardner, here resurrected from synonymy of *C. multiplinervia* Less.

Calea cabrerae differs from both *C. angustifolia* and *C. multiplinervia*, however, by short oblong (vs. elongate linear-lanceolate) pappus scales with an obtuse to rounded (vs. narrowly tapered) apex. By its short pappus scales and long-pedunculate capitula, *C. cabrerae* is similar to sympatric *C. rupicola* Chodat and to Brazilian *C. abbreviata* Pruski & Urbatsch. *Calea abbreviata* Pruski & Urbatsch, the nearest congener of *C. cabrerae*, is a sparsely pilose fewer-flowered reduced herb with narrow-campanulate disk corollas and erose sharp-tipped pappus scales, thus differing clearly from *C. cabrerae*. Moreover, *C. abbreviata* is a very narrow endemic of Chapada dos Veadeiros in northern Goiás, about 2100 km northeast of the single known station of *C. cabrerae*.

A second moderately similar regional species loosely placed in *Calea* sect. *Monanthocalea* (albeit peripheral there and similar as well to *Calea* sect. *Meyeria*) with short pappus scales is *C. rupicola*. But, C. *rupicola* is a leafy much-branched pilose broad-leaved plant with fewer-flowered capitula in an openly cymose capitulescence, and other than in its moderately similar short pappus scales, bears no particular close resemblance to *C. cabrerae*. *Calea rupicola* is well-collected in Paraguay, but occurs also in Brazil, albeit not listed for Brazil by Forrza et al. (2010). Here, I take the opportunity to document briefly *C. rupicola* in Brazil (it is expected in Bolivia and Argentina as well), where it is known from at least three collections made in Mato Grosso do Sul, each pre-dating the Brazilian catalogue.

Representative collections of **CALEA RUPICOLA** Chodat in **Brazil. Mato Grosso do Sul.** Mun. Corumba, Serra do Urucum, 15 Apr 1972, *Hatschbach 29520* (LP, MBM); Mun. Porto Murtinho, Corrego Capivara, 17 Mar 1985, *Hatschbach & Zelma 49212* (MBM, NY); Mun. Miranda, Fazenda 23 de Marco, 13 Oct 2003, *Hatschbach et al. 76292* (MBM, MO, US).

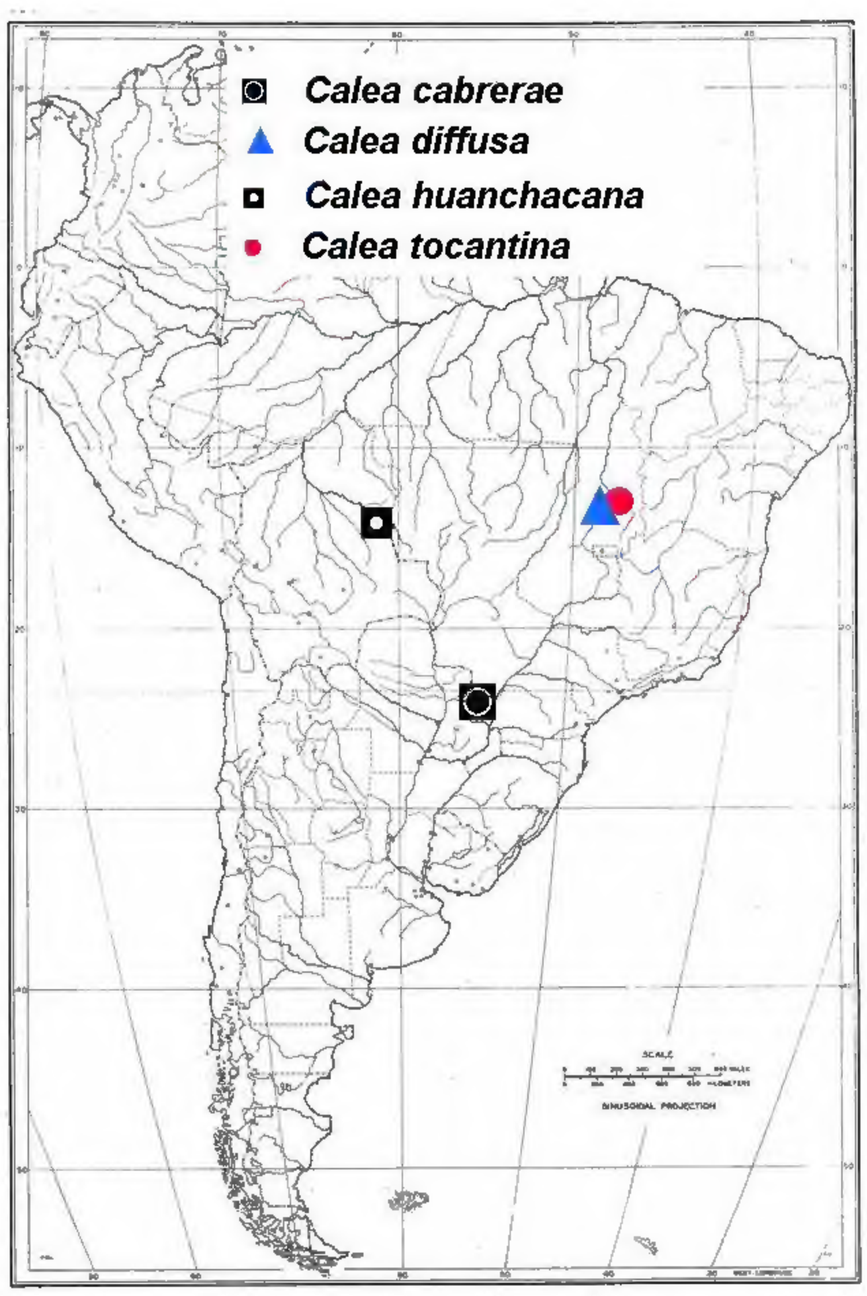

Figure 3. Distributions of *Calea cabrerae* Pruski, *Calea diffusa* Pruski, *Calea huanchacana* Pruski, and *Calea tocantina* Pruski.

CALEA HUANCHACANA Pruski, **sp. nov. TYPE: BOLIVIA. Santa Cruz.** Prov. Velasco, Parque Nacional Noel Kempff[sic] M., Meseta de Caparuch, 1.5 km S de la pista Noel Kempff M., cerrado abierto, suelo rojizo, arcillo arenoso, 13° 54' 22" S, 60° 48' 52" W, 190 m, 12 May 1994, *B. Mostacedo, L. Arroyo, S. Cabrera, H. Gonzales & J. Surubí 1684* (holotype: MO; isotype: USZ). Figs. 3, 4.

Plantae herbaceae perennes usque 77+ cm altae, caules hexagoni pilosi; folia sessilia, lamina lanceolata vel anguste elliptica (1.5–)3–8 × (0.3–)0.8–2.2 cm chartacea trinervata supra sparse pilosa vel pilosa subtus glandulosa et pilosa vel dense pilosa crenulata-serrulata; capitulescentia laxe cymosa-corymbiformis, pedunculis 7–15 cm longis; capitula radiata 9–12 mm longa, involucrum campanulatum vel hemisphaericum 8–11 × 8–12 mm, phyllaria gradatim circiter 4-seriata externa tenuiter herbacea pilosa, interna chartacea glabra obtusa vel rotundata(–acuta), clinanthium paleaceum; paleae anguste lanceolatae vel oblanceolatae 4.8–6.2 × 0.3–0.5 mm; flosculi radiati circiter 8, corolla 12.5–15 mm longa, limbo obovato 11–13 × 4–5.2 mm 5-nervio; flosculi disci circiter 22, corolla anguste infundibuliformis 4.2–5 mm longa glabra, lobis 1.5–1.6 mm longis; cypselae 3–4 mm longae glabrae; pappi squamellae minute 0.1–0.2 mm longae.

Slender perennial herbs to 77+ cm tall; stems trichotomous-branched, hexagonal with faces few-striate as well, brownish-green, pilose to densely pilose, trichomes mostly 2–3 mm long, leafy in proximal 1/2–2/3, leaves ascending or spreading, mid-stem internodes 5–11 cm long, about as long to sometimes longer than leaves. **Leaves** opposite, sessile; blade lanceolate to narrowly elliptic, (1.5–)3–8 × (0.3–)0.8–2.2 cm, thinly to moderately chartaceous, thinly trinerved from near base, smaller veins partly obscured by indumentum, adaxial surface sparsely to moderately pilose, flat to very slightly rugulose, abaxial surface pilose to densely pilose, also glandular, trichomes mostly 1.5–2 mm long, margins crenulate-serrulate, with 5–7 low teeth per margin, somewhat revolute, apex acuminate. **Capitulescence** laxly cymose-corymbiform in distal 1/3–1/2 of plant, (3–)9–14-capitulate, held well-above leaves, lateral branches to 40 cm long, 1–5-capitulate, strongly ascending and often overtopping central axis, pilose to sparsely pilose; peduncles 7–15 cm long, striate-sulcate, ebracteate, sparsely pilose. **Capitula** radiate, 9–12 mm long, ca. 30-flowered; involucre campanulate to hemispherical, 8–11 × 8–12 mm; phyllaries moderately graduate with the outer about half as long as the inner ones, ca. 4-seriate, mostly appressed, mostly 7–11-striate but innermost only 3–5-striate, entire; outer 2 phyllaries lanceolate-ovate, 4–8 × 3–4.5 mm, slightly spreading, thinly herbaceous, yellow-green, striations somewhat faint, pilose abaxially, adaxial surface scabrous, apex obtuse; abruptly transitioning to mid-series phyllaries ovate grading to more interior lanceolate-ovate, 5–11 × 2–4.6 mm, somewhat concave, chartaceous with scarious margins and apex to ca. 0.5 mm diam., yellowish with darker nerves and darker apex, striation obvious, margins sometimes ciliolate but abaxial surface glabrous and eglandular, apex obtuse to rounded; innermost few phyllaries oblanceolate, 7–9 × 1.4–2.2 mm, more or less flat, narrower than mid-series phyllaries and not visible without dissection, yellowish, glabrous, apex usually acute; clinanthium flat to low-convex, 2–2.5 mm diam., paleate throughout; paleae narrowly lanceolate to oblanceolate, 4.8–6.2 × 0.3–0.5 mm, broadest near the middle, flat, midrib dark, margins scarious, apex attenuate. **Ray florets** ca. 8; corolla 12.5–15 mm long, yellow, well-exserted from involucre, tube 1.5–2 mm long, glabrous, ligule obovate, 11–13 × 4–5.2 mm, 5-nerved, glandular abaxially, apex obtuse, 4-lobed. **Disk florets** ca. 22; corolla narrowly funnelform, 4.2–5 mm long (3.4–4.2 mm long when dry), yellow, glabrous and eglandular, tube 1–1.5 mm long, limb slightly broader then tube, throat only slightly longer than either tube or lobes, lobes triangular-lanceolate, 1.5–1.6 mm long, nearly as long as throat, veins intramarginal; anthers 2–2.4 mm long, appendage triangular-ovate; style base dilated-umbonate, 0.2–0.3 mm long, branches ca. 1.3 mm long, apex obtuse, laterally short-papillose. **Cypselae** cylindrical-oblong, 3–4 mm long, glabrous; pappus scales forming a minute rim, 0.1–0.2 mm long, much shorter than disk corolla tube, apex truncate to rounded.

Paratype: **BOLIVIA. Santa Cruz.** Prov. Velasco, Parque Nacional Noel Kempff Mercado, campamento La Torre, 13° 39′ 14″ S, 60° 49′ 52″ W, 300 m, 14 May 1994, *E. Gutiérrez et al. 958* (MO).

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BOLIVIA Holotype
COMPOSITAE
Calea huanchacana Pruski
Santa Cruz: Velasco det. John Pruski, 2007
Parque Nacional Noel Fempff M. Meseta de Caparuch. 1,5 km S de la pista Noel Kempff M. Vegetación cerrado alto, ecotono entre bosque alto y sabana arbolada (cerrado abierto). Pendiente plana con relieve uniforme. Suelo rojizo, arcillo arenoso.
13°54'22"S 060°48'52"W 190 m
Hierba. Flores amarillas.
12 Mayo 1994
B. Mostacedo, Arroyo, Cabrera, Gonzales & Surubí 1684
MISSOURI BOTANICAL GARDEN HERBARIUM (MO)

Figure 4. Holotype of *Calea huanchacana* Pruski. (*Mostacedo et al. 1684*, MO).

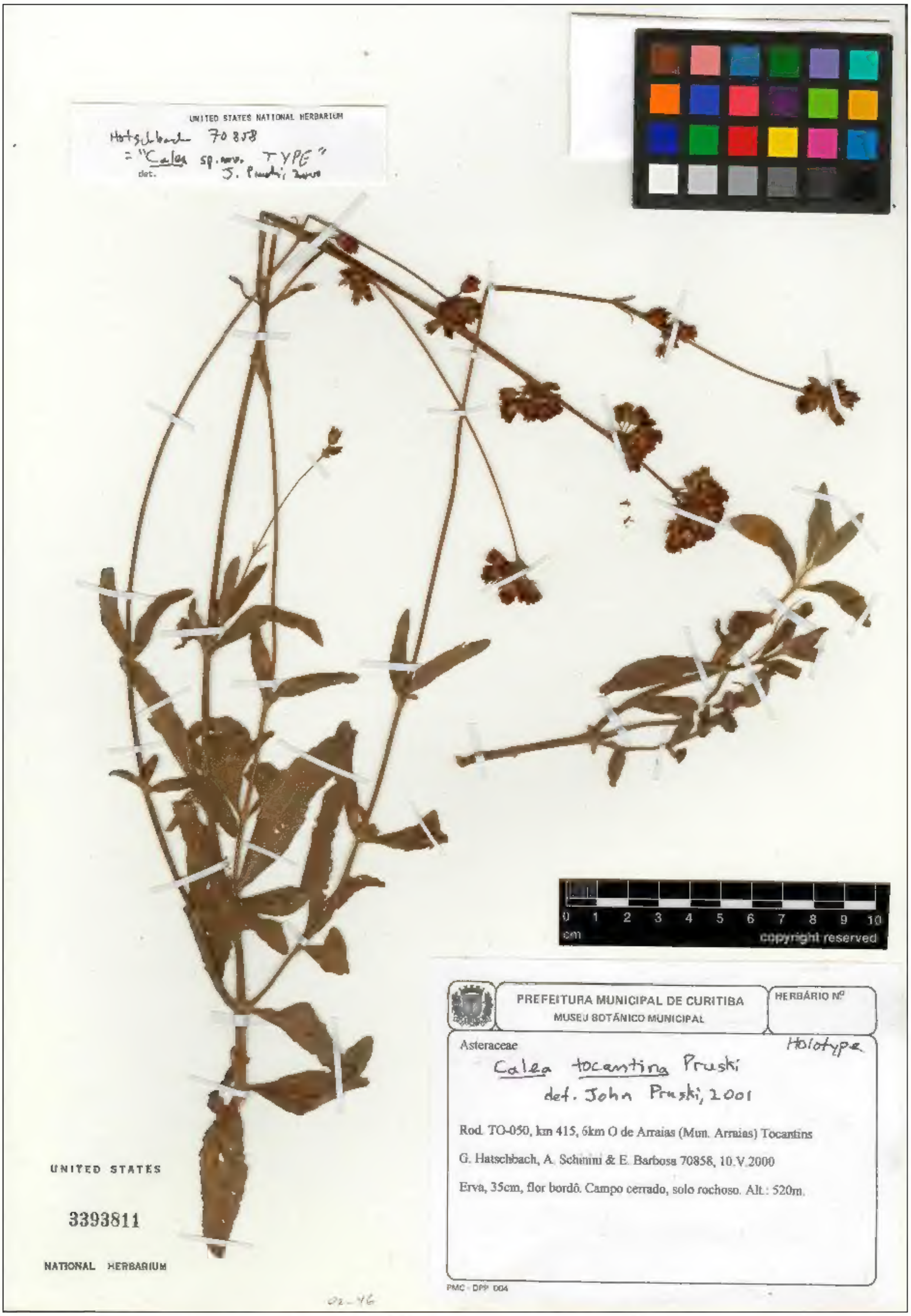
Etymology, Distribution, and Ecology. *Calea huanchacana* is endemic to the environs of Serranía de Huanchaca (whence the epithet) in eastern Bolivia, a western extension of the Planalto phytogeographic province. *Calea huanchacana* was collected flowering in savannas and cerrados (Killeen and Schulenberg 1998) during May 1994 from 190–300 meters elevation, and the paratype locality is within 5 kms of Brazil, where *C. huanchacana* should be expected. The sandstone Serranía de Huanchaca (an alternate name is Meseta de Caparuch; including the contiguous Serranía Negra to the north) is just west of the north-flowing Río Verde which flows into Río Guaporé forming part of the international frontier with Brazil near Serra de Ricardo Franco, Mato Grosso. Two species of *Calea* sect. *Meyeria*, i.e., *C. huanchacana* and *C. nematophylla* Pruski (aligned by Pruski 1998 with *Calea* sect. *Monanthocalea*), appear endemic to Huanchaca, neither presently known to me from adjacent Mato Grosso, Brazil.

By its minute pappus scales and capitulescence form, *C. huanchacana* is placed in *Calea* sect. *Meyeria*, species of which are mostly Brazilian, but with *C. huanchacana* raising to four the number of Bolivian endemics. By its narrow paleae, *C. huanchacana* is noteworthy in *Calea* sect. *Meyeria* and in this regard approaches *Calea sect. Monanthocalea*, from which it must be excluded, however, by its minute pappus. Within *Calea* sect. *Meyeria, C. huanchacana* is closest to the *C. pilosa-angusta* group, especially to the radiate species having either pilose or lanceolate leaves. Most of the pilose or lanceolate-leaved radiate species of the *C. pilosa-angusta* group, e.g., *C. angusta* S.F. Blake, *C. bahiensis* (Mattf.) H. Rob., *C. hatschbachii* Pruski & Hind, *C. martiana* Baker, *C. melissifolia* Baker, and *C. pilosa* Baker, are characterized by pappus scales usually 0.5–1.2 mm long and setulose cypselae, unlike the minutely pappose *C. huanchacana* that has glabrous cypselae. Were *C. rupicola* Chodat taken as belonging to *Calea* sect. *Meyeria*, it could be aligned with the six previous species of the *C. pilosa-angusta* group, thus being distinguished from *C. huanchacana*.

The four other minutely pappose radiate species, especially *C. anomala* Hassl. and *C. candolleana* (Gardner) Baker, of the *C. pilosa-angusta* group are perhaps most similar to *C. huanchacana* and differ from it as follows: Bolivian *C. anomala* occurs about 500 km to the south and is a hirtellous to hirsutulous plant with petiolate leaves and fewer-flowered short-pedunculate capitula having strongly graduate phyllaries that are always chartaceous; Brazilian *C. candolleana* is found about 1100+ kms to the east, and although a hirsutulous to pilose plant, has short-petiolate broad leaves, strongly graduate phyllaries, and broad paleae; Brazilian *C. elongata* (Gardner) Baker is a hirtellous plant characterized by somewhat indurate *Aspilia*-like phyllaries; and Brazilian *C. gardneriana* Baker is a hirtellous plant with strongly graduate phyllaries, glandular disk corolla tubes, and usually slightly broad lanceolate paleae. Lastly, the two other Bolivia species of *Calea* sect. *Meyeria* are not particularly closely related to C. *huanchacana*: *C. dalyi* Pruski & Urbatsch is discoid and purplish-capitulate; and *C. nematophylla* Pruski is a glabrous plant with filiform leaves and a longer pappus.

CALEA TOCANTINA Pruski, **sp. nov. TYPE: BRAZIL. Tocantins.** Mun. Arraias, Rod. TO-050, km 415, 6 km O de Arraias, 520 m, 10 May 2000, *G. Hatschbach, A. Schinini & E. Barbosa 70858* (holotype: US; isotype: MBM). Figs. 3, 5.

Plantae herbaceae perennes 0.4–0.9 m altae, caules subhexagoni pilosi distale hirsuti; folia sessilia vel brevipetiolata, lamina anguste elliptica vel oblonga (2.5–)4–9 × 0.5–2 cm chartacea trinervata supra pilosa subtus glandulosa et pilosa serrata vel serrulata; capitulescentia terminalis dense corymbiformis-umbellata, pedunculis (3–)5–10 mm longis; capitula discoidea 5–7.8 mm longa, involucrum anguste campanulatum 5–6 × 3–4 mm, phyllaria 6–8 gradatim 3-seriata distale purpurea interna acuminata-cuspidata, clinanthium paleaceum; flosculi disci circiter 10, corolla infundibuliformis 3.2–3.9 mm longa, lobis 1–1.3 mm longis; cypselae 2.5–2.8 mm longae glabrae; pappi squamellae circiter 12 circiter 0.2 mm longae.


UNITED STATES NATIONAL HERBARIUM
Hatschbach 70858
= "Calea sp. nov. TYPE"
det. J. Pruski, 2000
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PREFEITURA MUNICIPAL DE CURITIBA
MUSEU BOTÂNICO MUNICIPAL
HERBÁRIO Nº
Asteraceae
Holotype
Calea tocantina Pruski
def. John Pruski, 2001
Rod. TO-050, km 415, 6km O de Arraias (Mun. Arraias) Tocantins
G. Hatschbach, A. Schinini & E. Barbosa 70858, 10.V.2000
Erva, 35cm, flor bordô. Campo cerrado, solo rochoso. Alt.: 520m.
PMC - DPP 004
UNITED STATES
3393811
NATIONAL HERBARIUM

Figure 5. Holotype of *Calea tocantina* Pruski. (*Hatschbach et al. 70858*, US).

Perennial herbs 0.4–0.9 m tall; stems erect, leafy only in proximal 1/2, moderately-branched, striate-sulcate distally, subhexagonal at mid-stem, pilose to densely so in the leafy mid-stem becoming sparsely hirsute in the capitulescence, internodes usually shorter than leaves but distal-most 1–2 internodes elongated to ca. 10 cm; herbage with trichomes mostly 1–2.2 mm long, patent. **Leaves** opposite, subsessile or short-petiolate; petiole 0.1–0.5 cm long, pilose; blade narrowly elliptic to oblong, (2.5–)4–9 × 0.5–2 cm, chartaceous, thinly 3-veined from 0.5–1.5 cm above base, surfaces concolorous, pale green, adaxial surface sparsely to moderately pilose, eglandular, abaxial surface pilose, glandular, base attenuate to cuneate, margins serrate with 3–7 pairs of teeth or distal-most few leaves 1–2-serrulate, apex acute to narrowly obtuse, sometimes slightly mucronulate. **Capitulescence** terminal and open in distal 1/2 of plant, held well above subtending leaves, each of the ultimate clusters somewhat tightly corymbiform-umbellate at ends of 3–10 basically leafless branchlets nearly as long as central axis, infrequently greatly overtopping a single short-pedunculate solitary central capitulum, most branchlets subtended by paired narrowly oblanceolate pilose sessile leafy bracts 5–15 mm long, branchlet axis subtending ultimate clusters mostly 5–18 cm long, ultimate clusters usually 5–17+-capitulate and 1.5–3 cm diam., ultimate peduncles (3–)5–10 mm long, hirsutulous, sometimes appearing basally bracteolate by acuminate-tipped phyllaries of occasionally present adjacent budding sessile capitula. **Capitula** discoid, 5–7.8 mm long, ca, 10-flowered; involucre narrowly campanulate, 5–6 × 3–4 mm; phyllaries 6–8, graduated, 3-seriate, scarious, golden brown-stramineous proximally and maturing somewhat purplish distally, 5–7-nerved (nerves purplish), glabrous but with distal margins often sparsely ciliolate; outer 2–3 phyllaries ovate, 2–3 × 0.7–1.2 mm, hyaline margins usually 0.2–0.3 mm diam., apex acute; quickly grading to inner phyllaries oblong-ovate, 5–6 × 1.5–2 mm, apex acuminate-cuspidate by inrolled distal margins; clinanthium convex-clavate, 1–1.5 mm long, with the outer phyllaries often positioned about 1 mm below inner phyllaries, paleate; paleae subtending outer few florets basically indistinguishable from phyllaries, inner paleae oblong, 5.2–5.5 × 0.6–1.1 mm, conduplicate, pale yellow, 1–3-nerved, apex acute to acuminate, sometimes trifid. **Ray florets** 0. **Disk florets** ca. 10; corolla funnelform, 3.2–3.9 mm long, golden but the purplish marginal nerves of the corolla lobes imparting a distinct purplish ting to visible distal part of corolla, glabrous, tube, throat and lobes more or less subequal, tube 1.2–1.5 mm long, throat 0.8–1.2 mm long, moderately ampliate, nerves with orangish solitary embedded resin canal, lobes triangular-lanceolate, 1–1.3 mm long, ascending to slightly spreading; anthers not exserted, ca. 1.8 mm long, yellow, thecae with polarized endothecial pattern, cells usually with 2 globose thickenings per end wall, endothecial cells slightly longer than broad, ca. 14–20 µm long, apical appendage ovate-deltate, ca. 0.2 mm long, pauci-glandular; pollen 25–30 µm; style ca. 4 mm long, stylopodium free, held above nectary on stipe 0.2–0.3 mm long, nectary annular, 0.1–0.2 mm long, branches ca. 0.8 mm long, apex convex, short-papillose abaxially, papillae to 100 µm. **Cypselae** (immature) prismatic-obconic, 2.5–2.8 mm long, brownish but beginning to blacken at base, glabrous, carpopodium tan, somewhat asymmetric; pappus squamellae ca. 12, ovate, 0.1–0.2 mm long and much shorter than disk corolla tube, distinct but imbricate, apex rounded to truncate, serrulate-erose.

Paratype: **BRAZIL. Tocantins.** Mun. Paranã, Ponta 42 da fitossociologia, beira da estrada que costeia a mata, 12° 54' 24" S, 47° 13' 02" W, 420 m, 2 Apr 2004, *A.C. Sevilha et al. 4125* (CEN, MO).

Distribution and Ecology. *Calea tocantina* is known only from the environs of Serra de Arraias in southeastern Tocantins, Brazil, where it occurs from about 420–520 meters elevation and flowers in April and May.

Etymology. As spelled here, the geographical epithet "*tocantina*" is derived from the colloquial name for both the river and the region, constructed intentionally from the partial root "*tocant*" of the river and the political unit, and the adjectival termination "*ina*". The epithet *tocantina*

(or the respective neuter and masculine variants *tocantinum* or *tocantimus*) has been used for about ten other angiosperm species, but in the past two decades the equally acceptable *tocantinsensis* has been used about five times.

Calea tocantina by its reduced pappus is placed in *Calea* sect. *Meyeria*, albeit belonging to neither the typical *C. myrtifolia* (DC.) Baker group as defined by Pruski (1984, 1998, 2005), Pruski and Urbatsch (1988), and Pruski and Hind (1998) nor to the aforementioned radiate species of the *C. pilosa-angusta* group. Rather, by its habit and discoid capitula it is similar to several species of the *C. teucriifolia-hypericifolia* subgrouping as treated by Pruski and Urbatsch (1987, 1988) and Pruski (1998). Included among these similar discoid species are *C. dalyi* Pruski & Urbatsch, *C. diffusa* Pruski, *C. harleyi* H. Rob., *C. pinheiroi* H. Rob., *C. polycephala* (Baker) H. Rob., *C. purpurea* G.M. Barroso, and *C. robinsoniana* Pruski. Purplish-capitulate *C. tocantina* would key in Pruski and Urbatsch (1987) near minute-pappose purplish-capitulate *C. dalyi* and *C. purpurea*, where its closest affinities most likely rest.

Close congener *C. dalyi* has campanulate 11–13-flowered capitula with apically obtuse partly purplish (vs. acuminate-cuspidate inner) phyllaries, and *C. purpurea* has cylindrical mostly 3-flowered capitula with apically acute phyllaries deeply purple to near base. Although, *C. purpurea* has pointed phyllaries as does *C. tocantina* and is nearly sympatric with it (also at comparable elevations just west of Rio São Francisco), by other floral characters the two species are quite distinct. *Calea tocantina* actually is more similar to the 2000 km distant Bolivian *C. dalyi*, as my preliminary determination of *Hatschbach et al. 70858* of "n. sp. aff. *dalyi*" used in Bringel (2007) infers. *Calea tocantina* differs from *C. dalyi* most obviously by herbage with trichomes mostly 1–2.2 (vs. 0.2–0.6) mm long, adaxially eglandular (vs. glandular) leaf blades that are mostly 4–9 (vs. 1–3.5) cm long, and by the aforementioned apically acuminate-cuspidate (vs. obtuse) inner phyllary character.

A second minute-pappose discoid diffuse (whence the epithet) species of *Calea* sect. *Meyeria* from Brazil is described here. João Bringel appears to be the first to have collected fertile material of it, which he sent for determination. *Calea diffusa* was treated in *Bringel* (2007) as "*Calea* sp. 1."

In 1984, I annotated a diffusely branched post-fruiting *Calea* collected by Patricio da Silva Manso (Brazil, Cuiabá, 1834, *Silva Manso 145*, BR) as "*rubroglandulosa* Pruski sp. nov., ined. (sterile: need florets to describe)." Although *Silva Manso 145* is labeled as though collected far west of Chapada dos Veadeiros, it nevertheless appears to be the same taxon as *C. diffusa*. Perhaps *Silva Manso 145* was actually collected further to the east closer to Chapada dos Veadeiros, the known range of *C. diffusa*. In any case, the epithet *rubroglandulosa* is abandoned here and because *Silva Manso 145* is sterile it is not cited here as a paratype of *C. diffusa*, even though over the past few decades this collection has been central to my concept of what has grown into *C. diffusa*.

CALEA DIFFUSA Pruski, **sp. nov. TYPE: BRAZIL. Goiás.** Mun. Cavalcante, estrada para Araí, campo rupestre, 13° 40' 16.8" S, 47° 28' 30.2" W, 1088 m, 13 Apr 2004, *M. L. Fonseca, R. C. Mendonça, F. C. A. Oliveira & E. Cardoso 5033* (holotype: IBGE-60093; isotype: US). [The numbered stamped on the IBGE holotype is not perfectly legible]. Figs. 3, 6.

Plantae herbaceae perennes vel suffruticosa (0.6–)0.75–1 m altae, caules subteretes vel hexagoni hirsutula vel pilosa-hirsuta; folia sessilia vel subsessilia, lamina anguste elliptica vel oblanceolata 1.5–3.5 × 0.3–0.9 cm, chartacea pinnatim venosa vel infirme trinervata hirsutula vel hispidula glandulosa serrulata-crenulata; capitulescentia terminalis diffusa corymbiformis usque 25 × 15 cm 35–45+-capitulata, pedunculis 0.5–3 cm longis; capitula discoidea 6–8 mm longa, involucrum turbinatum-campanulatum 5–6.5 × 4–5.8 mm, phyllaria gradatim 3–4-seriata, clinanthium infirme paleaceum; flosculi disci 8–10, corolla campanulata 4–5 mm longa, lobis 1.1–1.5 mm longis; cypselae 3.5–4 mm longae glabrae; pappi squamellae 0.2–0.3 mm longae.

Figure 6. *Calea diffusa* Pruski. A. Mid-stem leaves. B. Distal portion of capitulescence. (from the holotype, *Fonseca et al. 5033*, IBGE).

Perennial herbs or subshrubs (0.6–)0.75–1 m tall; stems erect, moderately to densely leafy, moderately-branched, subterete to hexagonal, hirsutulous to pilose-hirsute, sometimes glabrate proximally. **Leaves** opposite, sessile or subsessile; blade narrowly elliptic to oblanceolate, widest near the middle, 1.5–3.5 × 0.3–0.9 cm, chartaceous, pinnately veined or sometimes 3-veined from well above base, midrib prominulous abaxially, surfaces green to brownish-red, hirsutulous to hispidulous, glandular, base narrowly cuneate to attenuate, margins remotely serrulate-crenulate, sometimes revolute, apex acute. **Capitulescence** terminal, diffusely corymbiform, to 25 × 15 cm, 35–45+-capitulate, held well-above subtending leaves, branches slender, minutely few-bracteolate, internodes to 5.5 cm long, lateral branchlets often overtopping the central axis, bracteoles scale-like, triangular, 1–1.5 mm long, spreading laterally at branching nodes; peduncles 0.5–3 cm, slender. **Capitula** discoid, 6–8 mm long, 8–10-flowered; involucre turbinate-campanulate, 5–6.5 × 4–5.8 mm; phyllaries strongly graduated, 3–4-seriate, scarious or outer few somewhat indurate, golden brown with darker nerves, glabrous or with distal margins sparsely ciliolate; outer few phyllaries triangular, 1–2 × ca. 1 mm, nerves indistinct, apex acute; grading to inner phyllaries ovate, 5–6.5 × 1.5–2.4 mm, 7–9-nerved, apex acute to obtuse; clinanthium very weakly paleate; paleae 1–few, flat, apex acute. **Ray florets** 0. **Disk florets** 8–10, exserted 1–2 mm from involucre; corolla campanulate, 4–5 mm long, yellow, glabrous, tube 1.4–1.7 mm long, throat ampliate, lobes triangular-lanceolate, 1.1–1.5 mm, slightly shorter than throat, ascending; anthers 2–2.5 mm long. **Cypselae** prismatic-obconic, 3.5–4 mm long, glabrous; pappus squamellae minute, 0.2–0.3 mm long and much shorter than disk corolla tube.

Paratype: **BRAZIL. Goiás**. Mun. Cavalcante, estrada para o povoado de Kalunga, Chefe Cirilo, 4 Feb 2004, *J. B. A. Bringel Jr. et al. 82* (CEN-54926).

Distribution and Ecology. Flowering material of *C. diffusa* is known only from campo rupestre in the northern portions of the Chapada dos Veadeiros near Cavalcante (about 50 km north of

Alto Paraiso de Goiás) in northeastern Goiás, Brazil. This apparently local endemic occurs at about 1050–1100 meters elevation and was collected in flower in February and April, 2004.

Within *Calea* sect. *Meyeria*, the affinities of *C. diffusa* reside with the species of the *C. pilosa-angusta* group sensu Pruski and Urbatsch (1987, 1988) and Pruski (1998). *Calea diffusa* is sympatric with minute-pappose *C. elongata* (Gardner) Baker, which is also centered in the Chapada dos Veadeiros and one of the more common species of the group, but *C. elongata* differs by its radiate capitula with indurate *Aspilia*-like phyllaries. *Calea diffusa* is moderately similar by its minute pappus to *C. candolleana* (Gardner) Baker and *C. gardneriana* Baker, but each differs from *C. diffusa* by fewer and larger radiate capitula. By leaf shape and minute pappus, *C. diffusa* is somewhat similar to *C. hypericifolia* (Gardner) Baker, which is a completely different plant with few radiate capitula and deeply lobed disk corollas. Neither do the closest affinities of *C. diffusa* appear to rest with the aforementioned discoid minute-pappose purplish-capitulate group, i.e., *C. dalyi* Pruski & Urbatsch, *C. purpurea* G.M. Barroso, and *C. tocantina* Pruski, each of which lacks the diffuse capitulescence so characteristic of the new species. Similarly differing from *C. diffusa* by lacking a diffuse capitulescence are the minute-pappose discoid-capitulate *C. polycephala* (Baker) H. Rob. group and the narrow-leaved minute-pappose *C. hymenolepis* Baker group.

It is by the diffuse capitulescence of slender-pedunculate relatively small discoid capitula that *C. diffusa* appears to be most similar to *C. robinsoniana* Pruski, which differs however by denser pubescent leaves that are twice as long and by 0.8–1.2 mm long pappus scales. Moreover, *C. robinsoniana* is extremely disjunct from *C. diffusa* and endemic to the upper reaches of the Rio Araguaia in southwestern Goiás and southeastern Mato Grosso, about 540 kms to the southwest of Chapada dos Veadeiros, where *C. diffusa* appears to be endemic.

CALEA PAPPOSA Malme, Ark. Bot. 24A(8): 50. 1932. **TYPE: BRAZIL. Mato Grosso.** Santa Anna da Chapada, in palude aperta, 7 Mar 1894, *Malme 1470B* (holotype: S; isotype: S).

Representative specimens examined. **BOLIVIA.** La Paz. Prov. Iturralde, Luisita, sabana húmeda W del Río Beni, 13° 05 ' S, 67° 15' W, 180 m, 22 Feb 1984, *Beck 9951* (NY). **BRAZIL. Mato Grosso.** Km 250, Xavantina–Cachimbo road, cerrado, 12° 49' S, 51° 46' W, 30 Nov 1967, *Philcox et al. 3310* (K, NY).

Pruski and Urbatsch (1988: 355), in their key to *C. lutea* Pruski & Urbatsch (*Calea* sect. *Calea*), cited *C. papposa* as occurring in Mato Grosso, Brazil and La Paz, Bolivia, but gave no vouchering collections. Here, the collection information for the materials seen by them is provided. The Bolivian station of *C. papposa* is about 180 km due east of the frontier with Madre de Dios, Peru, where this species should be expected. Pruski (1998) also reported *C. lutea* as a new record for Bolivia. These additions bring to 10 the number of species known in Bolivia: *C. anomala* Hassler, *C. brevifolia* Rusby, *C. coriacea* DC., *C. dalyi* Pruski & Urbatsch, *C. huanchacana* Pruski, *C. lutea* Pruski & Urbatsch, *C. nematophylla* Pruski, *C. papposa* Malme, *C. rhombifolia* S.F. Blake, and *C. solidaginea* Kunth subsp. *solidaginea*.

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